

# G. Aaron Alexander

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Citizenship: U.S.

## Research Interests:

Data driven investigations of regional scale hydrometeorological regimes, statistical analysis sub-seasonal to climate length forecasts, how uncertainty propagates through scales in atmospheric modeling, and investigations of how adaptations to changing climate influences risk and decision making. Additionally, atmospheric and climatic modeling through use of high-performance computing, and land-atmosphere interactions.

## Education:

### University of Wisconsin, Madison

**June 2020 – Present**

PhD Student in Water Resources Engineering, GPA: 4.0

Advisors: Dr. Daniel B. Wright & Dr. Steven P. Loheide II

Emphasis in Sub-Surface, Land-surface, and Atmosphere Interactions/Earth Systems Modeling of the Built Environment/Extreme Events

**Expected Graduation:** May 2025

### University of California, Davis

**August 2017 – March 2020**

Masters Student in Water Resources Engineering, GPA: 3.97

Advisor: Dr. Holly J. Oldroyd

Emphasis in Micrometeorology/Land-Surface Interactions/Earth Systems Modeling

### University of Nevada, Reno

**August 2013-May 2017**

B.S. in Physics and Atmospheric Sciences, GPA: 3.97

Honors:

*Magna Cum Laude*

*Westfall Scholar, Department of Physics 2017*

*University of Nevada, Reno Outstanding Senior Award 2017*

*NSF Nevada EPSCoR Grant Recipient 2016*

*University of Nevada, Reno Undergraduate Research Scholarship Recipient 2016*

*John W. James Scholarship Recipient 2016*

*Dean's List Fall 2013-Spring 2017*

## **Research Experience:**

### **Graduate Research Assistant**

**June 2020 – Present**

#### **University of Wisconsin, Madison**

- Developed new Land Surface Model parametrizations to represent sub-grid processes within the built environment.
- Investigated the impacts of widespread adoption of green infrastructure on the urban heat island and extreme precipitation in coastal communities of the Great Lakes Region.
- Worked closely with Milwaukee Metropolitan Sewerage District and the City of Madison in development of land surface model physics.

### **Graduate Research Assistant**

**August 2017 – March 2020**

#### **University of California, Davis**

- Lead field campaign across California to investigate land-surface interactions in hydrometeorological context
- Investigating the impacts of soil moisture and irrigation on land-surface characteristics and atmospheric boundary layer dynamics through the use of multivariate statistical techniques.
- Utilizing the Weather Research and Forecasting Model, in-situ observations, and satellite remote sensing data.
- Simulation of atmospheric dynamics of the Central Valley to close the ozone and surface energy budgets, and examine the relationship between entrainment and land-surface processes
- Time series data analysis for projects ranging from evapotranspiration characterization in the Central Valley to quantification of the Turbulent Kinetic Energy budget in Corvallis, OR.

### **Undergraduate Researcher**

**February 2016 – May 2017**

#### **University of Nevada, Reno**

- Advised by Dr. Heather Holmes as part of the Atmospheric Turbulence and Air Quality Laboratory.
- Studied how atmospheric variables impacted solar panel efficiency in the semi-arid climate of Nevada utilizing in-situ observations and the Weather Research and Forecasting Model.

### **Atmospheric Science REU**

**Summer 2015**

#### **Texas A&M University**

- Studied the growth of secondary aerosols at the WG Jones State Forest outside of Houston Texas and aided in the fabrication of the mobile Captive Aerosol Growth and Evolution environmental chambers.
- Participated in a field experiment investigating the Land-Sea Breeze in Galveston Texas.

## **Teaching Experience:**

### **Teaching Assistant**

**Winter Quarter 2020**

#### **Water Resources Simulation**

- Taught undergraduate level lecture once a week on the theory and implementation of numerical methods for water systems. Topics included discretization of differential equations, stability of numerical methods, and fundamental types models.

### **Engineering Communication Guest Lecture**

**April/October 2019**

- Taught undergraduate level lecture on impacts of the environment on engineering design. Covered how to read basic data so environmental factors could be considered in final design projects.

### **Teaching Assistant**

**Winter Quarter 2019 & Fall Quarter 2017**

#### **Introductory Fluid Mechanics**

- Organized laboratory lectures and demonstrations for junior level fluid mechanics course. Aided in proctoring examinations, grading laboratory reports, and aiding in creation of final laboratory video projects.

### **Undergraduate Weather Workshop**

**May/October 2018**

- Developed and taught a five-hour workshop for undergraduate civil and environmental engineering students as a 'Crash Course' on the theory behind atmospheric observation.
- Students interacted in groups to develop communication skills and generate a measurement campaign given a real-world scenario

### **Atmospheric Boundary Layer Dynamics Guest Lecture**

**November 2018**

- Taught graduate level lecture on atmospheric boundary layer modeling focusing on techniques used in current numerical weather predication models

### **Teaching Assistant**

**Winter Quarter 2018**

#### **Engineering Hydraulics**

- Led lab lecture and demonstration covering topics such as pipe flow and open channel flows. Aided in grading laboratory reports, grading midterm exams, and responding to student questions on course content.

## **Professional Service:**

### **American Meteorological Society Student Conference**

**February 2017 – Present**

- Helped organize AMS Student Conference in Austin Texas (2018), Phoenix Arizona (2019), Boston Massachusetts (2020), and New Orleans (2021).

- Corresponded with national partners for conference session suggestions, coordinated speakers, and planned interactive workshops for students to attend.

Sessions Planned:

*Conversations with Professionals 2021*

*Skills for the Field: Crash Course in Giving a Presentation 2020*

*The Social Sphere: Public Policy in the Weather Sector 2019*

*Graduate Student Panel 2019*

*Interactive Resume Workshop 2020, 2019, 2018*

*Academia Breakout Session 2018*

**Environmental & Water Resources Engineering Showcase February 2019 – April 2019**

- Helped organize inaugural Environmental & Water Resources Engineering Showcase for Civil and Environmental Engineering Department at UC Davis
- Acted as featured presenter to showcase applications of water resource information and Masters of Ceremony for event

**Meteorology and Climate - Modeling for Air Quality August 2017-September 2017**

- Volunteered to help plan National Conference for Meteorology, Climate, and Air Quality. Worked to finalize details pertaining to food, organization, and enforced time restrictions for entire conference.

**Publications:**

- **Alexander G. A.**, X. Sun, D. Capputi, I. Faloona, H. A. Holmes, and H. J. Oldroyd: Implications of Modeled Soil Moisture on Land-Atmosphere Interactions and Simulated Flows in the Central Valley, California (*In Preparation*)
- Kelley J., D. McCauley, **G. A. Alexander**, W. Gray, R. Siegfried, and H. J. Oldroyd: Using Machine Learning to Integrate On-Farm Sensors and Ag-Weather Networks into Site-Specific Decision Support. American Society of Agricultural and Biological Engineers (*In Review*).
- Trousdell J, I. Faloona, D. J. Caputi, S. Conley, **G. A. Alexander**, and H. J. Oldroyd: Entrainment Rates and Their Synoptic Dependence on Wind Speeds Aloft in a Three-Layered Valley Atmosphere (*In Preparation*)

**Conference Presentations:**

- **Alexander G. A.**, X. Sun, J. Trousdell, I. Faloona, H. A. Holmes, and H. J. Oldroyd: Implications of Soil Moisture on Modeled Land-Atmosphere Interactions over

Heterogenous Terrain. *Meteorology and Climate – Modeling for Air-Quality*, Davis, CA, UC Davis , 11-13 Sept 2019

- **Alexander G. A.**, H. A. Holmes, J. Trousdell, I. Faloona, and H. J. Oldroyd: The Influence of Irrigated Soil Moisture on Modeled Land-Atmosphere Interactions and Simulated Flows in the San Joaquin Valley, California. *33<sup>rd</sup> Conference on Hydrology*, Phoenix, AZ, Amer. Meteor. Soc.
- Faloona, I., D. Caputi, J. Smoot, N. Falk, S. A. Conley, **G. A. Alexander**, H. J. Oldroyd: Synoptic Controls on Entrainment Mixing, Shear, and The Three-Layer Atmosphere Above the San Joaquin Valley of California. *23rd Symposium on Boundary Layers and Turbulence*, Norman, OK, Amer. Meteor. Soc.
- **Alexander, G. A.**, H. A. Holmes, W. P. Arnott, J. C. Barnard, A. Rollings: Determining Atmospheric Conditions That Impact Solar Energy Potential in Nevada. *Eighth Conference on Weather, Climate, Water and the New Energy Economy hosted at Annual AMS National Conference 2018*, Seattle, WA, Amer. Meteor. Soc.
- **Alexander, G. A.**, D. Collins, M. Salgado: Direct Measurement of the Impact of Atmospheric Processing on the Size and Properties of Sub- and Super-micron Aerosol Particles. *15<sup>th</sup> Annual AMS Student Conference*, New Orleans, LA, Amer. Meteor. Soc.